ISSN: 2757-6817

Unika Sağlık Bilimleri Dergisi
Unika Journal of Health Sciences

Araştırma Makalesi/Research Article

Evaluation of the Depression Level of Staff Working in Karabük Training and Research Hospital, According to Coffee Consumption

Karabük Eğitim ve Araştırma Hastanesi'nde Çalışan Personelin Depresyon Düzeyinin Kahve Tüketimine Göre Değerlendirilmesi

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Abstract: The objective of this study is to evaluate the depression levels of the staff working at Karabük Training and Research Hospital according to their coffee consumption. This cross-sectional and descriptive study was conducted among 380 participants. The data were collected through the administration of a questionnaire, which included sociodemographic data, questions regarding coffee consumption habits, and the Beck Depression Scale. The data were then analysed using SPSS 25 software. The study found that participants who consumed more than four cups of coffee per day exhibited significantly higher levels of depression compared to those who consumed less than one cup per week. Participants who reported side effects related to coffee consumption, particularly palpitations, had higher depression scores. Multivariate logistic regression analysis found that only coffee consumption habits lasting longer than three years were an independent predictor of depression risk [OR=1.736; 95% GA: (1.138–2.647), p=0.010]. Healthcare workers who consumed coffee for more than three years had a 73.6% increased risk of developing depression. Further prospective randomized studies are needed to support our findings.
Keywords: Coffee consumption, Depression, Coffee types, Caffeine.

Öz: Bu çalışmanın amacı, Karabük Eğitim ve Araştırma Hastanesi'nde çalışan personelin kahve tüketimine göre depresyon düzeylerini değerlendirmektir. Kesitsel ve tanımlayıcı tipteki bu çalışma, 380 katılımcı ile yürütülmüştür. Veriler; sosyodemografik veriler, kahve tüketim alışkanlıkları ile ilgili sorular ve Beck Depresyon Ölçeği'ni içeren bir anket uygulanarak toplanmıştır. Daha sonra SPSS 25 programı kullanılarak veriler analiz edilmiştir. Çalışma, günde dört fincandan fazla kahve tüketen katılımcıların, haftada bir fincandan az tüketenlere kıyasla anlamlı derecede daha yüksek depresyon düzeyleri sergilediğini ortaya koymuştur. Kahve tüketimiyle ilişkili yan etkiler, özellikle çarpıntı bildiren katılımcıların depresyon puanları daha yüksekti. Çok değişkenli lojistik regresyon analizi, yalnızca üç yıldan uzun süren kahve tüketim alışkanlıklarının depresyon riskinin bağımsız bir predüktörü olduğunu bulmuştur [OR=1,736; %95 GA: (1,138–2,647), p=0,010]. Üç yıldan fazla süredir kahve tüketen sağlık çalışanlarının depresyon geliştirme riski %73,6 artmıştır. Bulgularımızı desteklemek için daha fazla yapılacak prospektif randomize çalışmalara ihtiyaç vardır.
Anahtar Kelimeler: Kahve tüketimi, Depresyon, Kahve türleri, Kafein.

Introduction

Depression, the most prevalent psychiatric illness encountered by primary care workers, has been demonstrated to result in frequent admissions, unwarranted laboratory tests, and protracted loss of workforce (Ocaktan et al, 2004).

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Makale Gönderim: 10.11.2025 Makale Kabul: 05.01.2026 Makale Yayın: 30.04.2026

It is hypothesised that a variety of nutrients and nutrient compounds may have an effect on the emergence and persistence of depressive disorders and the severity of depressive symptoms. New agents (leptin, ghrelin, IGF-1, etc.) that cause energy mood change and homeostasis that are effective in brain-intestinal circuits have been identified (Wang and Kasper, 2014).

The tropical shrub species of the genus Coffea, which belongs to the Rubiaceae family, is the source of the seeds and the beverage prepared from these seeds, which are collectively referred to as "coffee" (Ana Britannica, 1994).

Caffeine has been shown to cross the blood-brain barrier with ease due to its ability to dissolve readily in both lipids and water, and its low molecular weight (Kablan et all, 2022). The substance has been shown to have psychostimulant properties, due to its antagonistic effect on adenosine receptors. It has been hypothesised that the ingestion of the substance in question may result in a number of undesirable consequences, including, but not limited to, an increase in gastric acidity and a diuretic effect. Coffee also contains cafestol and coffeol, the main cholesterol-raising factors (Sözlü et all, 2017) and chlorogenic acid, the component responsible for antioxidant properties (Sözlü et al, 2017, Naveed et al, 2018).

Some Health Effects

A cross-sectional study of 554 patients in Japan found an inverse association between metabolic syndrome and coffee consumption (Takami, 2013).

Two separate cohort studies have identified an inverse correlation between caffeine intake from tea, coffee and non-coffee products, and the risk of developing Parkinson's disease. However, this association was not observed in the case of decaffeinated coffee (Ascherio et al, 2001).

A number of studies have indicated that the regular consumption of coffee may offer a protective effect against liver cell damage, irrespective of the presence of factors that have been demonstrated to induce liver damage, including alcohol, drugs and viruses (Felix et al, 2014).

A study was conducted that yielded the conclusion that caffeine does not increase the risk of atrial fibrillation. On the contrary, low doses of caffeine have been found to have a protective effect (Caldeira et al, 2013).

The protective effect of coffee against cancer is attributed primarily to its antioxidant properties. However, the potential mechanisms by which coffee exerts its protective effects may

also include its ability to facilitate DNA damage repair and to suppress inflammation (Bøhn et al, 2014, Mursu et al, 2005, Yamashita et al, 2012).

Depression is characterised by a persistent feeling of sadness and a reduced ability to function effectively. The etymology of the term can be traced back to the Latin word "depressus" (Çelik and Hocaoğlu, 2016).

The prevalence of the condition is higher in the 25-44 age group (Angst, 1992) reported the prevalence of major depression as 4.4-19.6%, and (Kessler, 1994) reported 17%. The prevalence of this condition is higher in female subjects than in male subjects (Rhimer and Angst, 2009).

Risk Factors for Depression

The impact of childhood traumas on the development and character of individuals has been well-documented (Işık et al, 2013).

Research has indicated that depression is more prevalent among unmarried individuals compared to those who are married (Rhimer and Angst, 2009).

The prevalence of major depression varies between 5-10% in inpatients, 9-16% in outpatients and 1.5-50% in cancer patients (Katon and Schulberg, 1992, McDaniel et al, 1995, Silverstone et al, 1996, Katon and Ciechanowski, 2002).

A history of depression in a first-degree relative has been demonstrated to result in a 2-3-fold increase in the risk of depression (Yıldırım et al, 2005, Çelik and Hocaoğlu, 2016).

Intense life stress, material and moral losses, loss of a parent before the age of 11, and exposure to sexual abuse in children have been demonstrated to result in increased life stress and, consequently, depression (American Psychiatric Association, 2013).

Types of Depression

Major depression is characterised by the presence of five or more of the diagnostic criteria almost every day and/or for most of the day for two consecutive weeks. At least one of the following must be present: loss of desire/interest or depressed mood (Çakır, 2009).

Dysthymia: depressive symptoms must be present for at least two years. Patients exhibit conditions such as constant inner distress, feelings of inadequacy and pessimism (Özyurt and Emiroğlu, 2019).

Premenstrual syndrome: symptoms such as severe depression and tension start approximately one week before menstruation and end with it (Tamam and Demirkol, 2019).

Materıals and Methods

The study was approved by Karabük University Non-Interventional Clinical Research Ethics Committee (date: 17.09.2024, number: 2024/1874). The study was also approved by the Ministry of Health, Karabük Training and Research Hospital Chief Medical Directorate (date: 05.11.2024, number: 258624207). The population of the study consisted of the personnel in Karabük Training and Research Hospital. The present study comprised a sample of 402 individuals, who were selected via random sampling. 22 participants were excluded because of their history of psychiatric illness, antidepressant use, and incomplete questionnaire completion. Prior to participation, verbal consent was obtained from all subjects.

Exclusion Criteria

Being diagnosed with psychiatric illness and/or taking psychiatric medication, not being a staff member at Karabük Training and Research Hospital, incomplete answers to survey questions.

Beck Depression Scale (BDS)

The scale was developed by Beck and colleagues in 1961 with the objective of measuring behavioural symptoms of depression in adults and adolescents (Sofi et al, 2007). The scale was developed for the purpose of monitoring treatment changes, evaluating the severity of depression, and delineating the illness. The items on the scale are predominantly derived from observations made during psychoanalytic treatment of depressed patients. The symptoms and behaviors associated with depression are delineated in a series of sentences, each of which is numbered from 0 to 3. The scale comprises 21 items, ranging from mild to severe (Van Gelder et al, 2007).

Statistical Analysis of Data

The statistical program SPSS 25 was utilised to evaluate the findings. The normality of the distribution was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The numerical variables were characterised using median, minimum, maximum, mean and standard deviation. Categorical variables were presented as number and percentage. In the context of continuous variables, the Mann-Whitney U test was employed for the purpose of comparing two independent groups. In scenarios where the data did not adhere to a normal distribution, the Kruskal-Wallis test was utilised for the comparison of more than two groups. The comparison of categorical data was conducted through the utilisation of the Pearson chi-square test.

Results

The results of the study revealed that a significant proportion of the participants consumed Turkish coffee, with 90.26% of the sample opting for this option. In addition, 11.05% of the participants consumed granulated coffee, while 10.53% opted for filter coffee. Espresso coffee was selected by 5.26% of the participants, and 3.42% of the participants consumed espresso-based coffee. The lowest percentage of participants, at 1.05%, consumed decaf (decaffeinated coffee) (Table 1).

Table 1: Participants' Consumption of Coffee Types

Type of Coffee Consumed	Not consuming	Consuming
	N (%)	N (%)
Turkish Coffee	37 (9.74)	343 (90.26)
Granulated coffee	338 (88.95)	42 (11.05)
Filter Coffee	340 (89.47)	40 (10.53)
Espresso Coffee	360 (94.74)	20 (5.26)
Espresso Based Coffee	367 (96.58)	13 (3.42)
Decaf/ Decaffeinated Coffee	376 (98.95)	4 (1.05)

In response to the question regarding coffee consumption, a range of answers was provided by the participants. Consequently, the highest coffee consumption was observed among individuals who either did not consume coffee or consumed no more than one cup per day, constituting 51.05% of the 194 respondents. The number of people consuming six or more cups of coffee per day was minimal, with only 5 people and 1.32% of the sample (Table 2. In response to the query regarding the duration of their coffee consumption habits, the predominant response indicated that the participants had been consuming coffee for a period exceeding five years, with a proportion of 38.94% among 148 individuals. This was followed by 102 people who had been consuming coffee for less than 1 year, with a rate of 26.84%, and the least common answer was 48 people who had been consuming coffee between 3-5 years, with a rate of 12.63% (Table 2).

Table 2: Amount and Duration of Participants' Coffee Consumption

		N (%)
How many cups of coffee do you consume on average?	0-1 cup daily	194 (51.05)
	2-3 cup daily	104 (27.37)
	4-5 cup daily	16 (4.21)
	6 or more cups daily	5 (1.32)
	0-1 cup per week	52 (13.68)
	4-6 cups per week	9 (2.37)
How long have you been a coffee drinker?	Less than 1 year	102 (26.84)
	1-3 year	82 (21.58)
	3-5 year	48 (12.63)
	More than 5 years	148 (38.94)

A subsequent comparison of the sociodemographic characteristics of the participants with their BDI scores revealed that those whose income was less than their expenditure had a statistically significant higher BDI score than those whose income was equal to their expenditure and those whose income was more than their expenditure. However, no significant findings were observed in the comparison of other parameters with BDI (Table 3).

Table 3: Comparison of Participants' Sociodemographic Characteristics and BDI Scores

		BDI Score		
		Median (Minimum-maximum)	**Average±standard deviation**	**p**
Sex	**Male**	10 (0-52)	11.4±8.91	[a]0.060
	Woman	11 (0-46)	12.62±8.38	
Education Status	**High school and below**	10 (0-52)	12.01±9.09	[a]0.887
	High school and above	10 (0-44)	11.83±8.27	
Marital Status	**Married**	10 (0-52)	11.44±8.34	[a]0.185
	Single	11 (0-44)	12.97±9.38	
Monthly Income	**Income less than expenditure**	12 (0-52)	13.83±9.63	
	Income equal to expenditure	10 (0-46)	11.36±8.4	
	Income more than expenditure	10 (0-29)	10.41±7.44	[b]**0.030***
Cigarette	**Yes**	11 (0-46)	12.78±9.04	[a]0.053
	No	10 (0-52)	11.04±8.26	
Alcohol	**Yes**	13 (0-44)	14.63±11.47	[a]0.230
	No	10 (0-52)	11.59±8.26	
Chronic Disease	**No**	10 (0-52)	11.79±8.93	[a]0.305
	Yes	11 (0-29)	12.35±7.92	
Regular Drug Use	**Yes**	10 (0-29)	11.26±7.62	[a]0.704
	No	10 (0-52)	12.09±8.98	

A subsequent comparison of the BDI scores with the types of coffee consumed revealed that individuals who drank only espresso coffee exhibited a BDI score that was statistically significantly higher than those who did not consume this particular type of coffee. However, no statistically significant findings were observed in relation to other types of coffee (Table 4).

Table4: Comparison of the Types of Coffee Consumed by the Participants with Their BDI Scores

Type of Coffee Consumed		**BDI Score**		
		Median (Minimum- maximum)		**P Average± standard deviation**
Turkish Coffee	**Not consuming**	13 (0-52)	14.68±10.89	
	Consuming	10 (0-46)	11.62±8.4	[a]0.106
Filter Coffee	**Not consuming**	10 (0-52)	11.79±8.77	
	Consuming	12 (0-29)	13±8.08	[a]0.210
Granulated Coffee	**Not consuming**	10 (0-52)	11.76±8.75	
	Consuming	12 (1-34)	13.24±8.25	[a]0.180
Espresso Coffee	**Not consuming**	10 (0-46)	11.58±8.29	
	Consuming	15 (0-52)	18.1±12.97	[a]**0.018***

A comparison was made between the amount and duration of coffee consumption and the BDI scores of the participants. It was found that the BDI score of the participants who had been consuming coffee for a period of more than three years was statistically significantly higher than those who had been consuming coffee for three years or less (Table 5). Furthermore, it was found that the BDI score of the participants who consumed the highest amount of coffee (more than four cups per day) was statistically significantly higher than the participants who consumed the least amount of coffee (less than one cup per week) (Table 5).

Table 5: Comparison of Participants' Amount and Duration of Coffee Consumption with BDI Scores

		BDI Score		
		Median (Minimum-maximum)	**Mean±standard deviation**	**p**
AverageNumberof Cups of Coffee Consumed Per Day	**1 cup or less daily**	10 (0-52)	11.36±8.38	
	More than 1 cup daily	10 (0-44)	13.07±9.24	[a]0.122
AverageCoffee Consumption	**More than 4 cups daily**	21 (4-37)	20.57±9	
	Less than 1 cup a week	10 (0-42)	11.87±9.29	**[a]<0.001****
How Long a Coffee Consumption Habit	**3 years and less**	9 (0-37)	10.99±8.38	
	More than 3 years	11 (0-52)	12.79±8.93	**[a]0.023***

While the BDI score of the participants who did not experience side effects was found to be statistically significantly lower than those who did experience side effects, among the side effects experienced, the BDI score of those who only experienced palpitations was found to be statistically significantly higher than those who did not experience palpitations (Table 6).

Table 6: Comparison of Participants' Side Effects Related to Coffee Consumption and BDI Scores

Side effect you experienced related to your coffee consumption		**BDI Score**		
		Median(Minimum-maximum)	**Mean±standard deviation**	**p**
Side Effect	**No**	9 (0-52)	10.97±8.40	**[a]0.002****
	Yes	12 (0-46)	13.61±8.99	
Insomnia	**No**	10 (0-52)	11.51±8.71	[a]0.64
	Yes	12 (0-37)	13.23±8.57	
Palpitations	**No**	10 (0-52)	11.68±8.63	**[a]0.029***
	Yes	15 (0-44)	14.86±9.16	
Stomach Discomfort	**No**	10 (0-52)	11.63±8.38	[a]0.092
	Yes	14 (0-46)	15.16±11.42	

Multivariate logistic regression analysis with the dependent variable of depression according to the Beck Depression Inventory was conducted using the Enter method. The overall fit of the model was acceptable (Omnibus χ^2=17.340 (sd=6), p=0.008; Hosmer–Lemeshow χ^2=7.239 (sd=7), p=0.404). Among the independent variables, only coffee consumption for

more than 3 years increased the likelihood of depression by 73.6% (OR=1.736; 95% CI: 1.138–2.647; p=0.010). The presence of asthma showed a borderline increasing trend, but was not statistically significant (OR=3.470; 95% CI: 0.909–13.238; p=0.069). Although the model was significant, its explanatory power was limited (Nagelkerke R^2=0.060) (Table 7).

Table 7: Determinants of Depression According to the Beck Depression Inventory: Multivariate Logistic Regression Analysis

Variable (reference)	Category	B	p	OR	95% GA Lower	95% GA Upper
Marital status (Single)	**Married**	-0.389	0.090	0.677	0.432	1.063
Heart disease (No)	**Yes**	-0.790	0.175	0.454	0.145	1.420
Asthma (No)	**Yes**	1.244	0.069	3.470	0.909	13.238
Duration of coffee consumption (≤3 years)	**>3 years**	0.551	**0.010**	1.736	1.138	2.647
Effect on work performance (No effect)	**Positive**	-0.278	0.200	0.757	0.495	1.158
Effect on work performance (No effect)	**Negative**	1.723	0.121	5.599	0.634	49.470

Discussion

A plethora of studies have previously investigated the correlation between coffee consumption and mental health. However, the findings have proven to be inconsistent. Two meta-analyses have demonstrated a protective effect of coffee against the risk of depression. One of these meta-analyses reported a non-linear J-shaped association between coffee consumption and depression, while the other found an inverse linear association (Grosso et al, 2016, Wang et al, 2016).

A prospective study of 9,576 adults from the Korean population found that frequent coffee drinkers (i.e. those who consumed ≥2 cups of coffee per day) had a 32% lower prevalence of depression compared to non-coffee drinkers (Kim and Kim, 2018). However, a number of studies have identified a positive or non-existent association between coffee consumption and mental disorders. Two cross-sectional studies based on student populations found a positive association between caffeine intake and symptoms of depression and anxiety (Richards and Smith, 2015, Bertasi et al, 2021). A study involving 2,011 participants from Finland demonstrated that coffee consumption did not reduce the risk of depression (Hintikka et al, 2005). Conversely, a cross-sectional study conducted among Japanese automotive factory workers revealed no substantial correlation between coffee consumption and psychological well-being (Kawada, 2021). In the prospective analysis of Min et al. (2023), which included a large group of participants, it was reported that coffee consumption exhibited a J-shaped relationship in terms of depression and anxiety. Specifically, the lowest risk was associated

with 2-3 cups of coffee consumption per day, while consumption of 6 cups or more increased the risk (Min et al, 2023). The findings of this study demonstrate that the increase in depressive and anxiety symptoms that is concomitant with an increase in caffeine consumption is a finding that has been replicated in a number of studies. Conversely, the observation that depression scores were elevated in the present study, particularly among individuals who consumed more than four cups of coffee daily, aligns with the "increased risk of overconsumption" segment of the findings reported by Min et al. Nevertheless, further investigation is necessary to elucidate the specific impact of coffee type, additives (e.g., milk, sugar), and subgroups on this association. The analysis incorporated both ground coffee and decaffeinated coffee. In Min et al.'s study, the consumption of two to three cups of "milky" or "unsweetened" coffee was associated with a lower risk of depression and anxiety. However, our analysis revealed that preferring black, milky, sweetened or flavoured coffee did not have a significant impact on depression levels. This discrepancy may be attributable to a range of factors, including sample size, cultural drinking habits, the presence and type of additives in coffee, and measurement methodologies. Furthermore, while Min et al.'s study utilised a longitudinal approach to examine the potential causal relationships between coffee consumption and depression, our cross-sectional design does not allow for a comparable degree of analysis. The findings of this study indicate that the impact of coffee consumption on depression and anxiety may vary according to the quantity, type and additives consumed, and that these variations may be contingent on population characteristics. The issue is further complicated by the finding of studies conducted by Luebbe et al. and James et al. that no significant association was found between caffeine intake and conditions such as depression or anxiety (Luebbe and Bell, 2009, James et al, 2011). Conversely, a study undertaken by Bertasi et al. on a sample of university students found that symptoms of depression, including loss of appetite or overeating, and feelings of hopelessness, were positively associated with caffeine consumption (Bertasi et al, 2021). In a similar vein, a study by Kaplan et al. demonstrated that individuals consuming 500 mg or more of caffeine per day exhibited a high risk of depression. This finding stood in contrast to the results of the current study (Kaplan et al, 1997). Moreover, a data analysis conducted in 2015 among secondary school students revealed that the incidence of depression decreased as the level of caffeine consumption increased (Richards and Smith, 2015).In a separate study by Ruusunen et al., it was reported that middle-aged males observed a correlation between coffee consumption and a reduced risk of depression, although the dose of caffeine was not associated with this (Ruusunen et al, 2010). In addition, Smith et al. also reported that caffeine Furthermore, Smith et al. reported an inverse association between caffeine consumption and

depression risk, finding that caffeine consumers had a lower risk of depression than non-consumers (Smith, 2009). While caffeine is generally considered to trigger anxiety at doses above 300 mg, a weak association has been reported between caffeine consumption and anxiety or anxious traits (Childs and De Wit, 2006). A cohort study of 3,323 students aged 11–17 consumption was associated with a reduced risk of depression compared to non-consumers (Smith, 2009). Caffeine is widely regarded as a stimulant that can induce feelings of anxiety when consumed in doses exceeding 300 mg. However, a modest correlation has been documented between caffeine intake and the presence of anxiety, as well as anxious personality traits (Childs and De Wit, 2006). In a cohort study of 3,323 students aged 11-17 years (48.5% male; 51.5% female), it was found that the effect of caffeine on anxiety was not significant in girls, but anxiety increased as caffeine consumption increased in boys (Botella and Parra, 2003).However, a study conducted by Gilliland and Andress reported the negative effects of caffeine on stress and mental health (Gilliland and Andress, 2023). The study revealed that a sample of students who consumed moderate to high amounts of caffeine had higher levels of anxiety compared to those who did not consume caffeine (Gilliland and Andress, 1981). This study, which was conducted on Taibah University students, focused on a relatively young population, with the average age of the participants being around 21 years old and the majority being female students (approximately 74%). The elevated prevalence of stress, anxiety and depression (65.4%, 75.2%, 71.9%) in the study population indicates that young adults may be experiencing an augmented mental burden due to academic and social life conditions (Makki et al, 2023).However, no statistically significant relationship was found between the average daily caffeine intake (approximately 324.9 mg/day) and depression, anxiety and stress levels. However, in the present study, the focus was on a higher average age adult population (hospital staff), and it was demonstrated that depression scores were significantly higher, particularly in participants who consumed more than four cups of coffee per day or had a long-term coffee consumption habit. Furthermore, a correlation has been identified between depression levels and caffeinated coffee consumption, particularly in espresso-based beverages.

The potential causes of this variation may encompass differences in the age, occupation and lifestyle of the sample groups examined (for instance, hectic work schedules, general health status, sleep habits), methodological discrepancies in the scales utilised, and cultural diversity in the distribution of caffeine intake by form (coffee, tea, carbonated beverages, etc.). In the Taibah University study, the measurement of caffeine intake was conducted in terms of milligrams per day. Conversely, the present study utilised a different methodology, quantifying

caffeine intake in cups of coffee. A key distinction of the present study is that it did not consider non-caffeine factors, such as additives, meal patterns, and work pace, which may have confounded the results. Consequently, the divergent outcomes observed in the two studies can be attributed to variations in population characteristics and the methodologies employed for monitoring caffeine consumption. The observed inverse correlation between categories of excessive coffee consumption is consistent with previous literature. On the one hand, several cross-sectional studies have assessed this association (Hintikka et al, 2005, Pham et al, 2014, Park and Moon, 2015, Omagari et al, 2014, Niu et al, 2009).

A number of studies have been conducted on the relationship between coffee consumption and depression risk. The results of these studies are inconclusive, with some studies indicating a significant inverse association between coffee consumption and depression risk, and others indicating no such association (Hintikka et al, 2005, Niu et al, 2009).

Nevertheless, given the cross-sectional design of these studies, the possibility of reverse causality cannot be discounted. Conversely, three prospective studies have longitudinally assessed the association between coffee consumption and depression risk (Lucas et al, 2011, Ruusunen et al, 2010, Guo et al, 2014). These three prospective studies were combined in two independent meta-analyses.(Grosso et al, 2016, Wang et al, 2016) The combined results indicated an inverse association between coffee consumption and depression risk. A perusal of the settings in which the three prospective cohort studies were conducted reveals that two of them were conducted in the USA (Lucas et al, 2011, Niu et al, 2009). while another was conducted in Finland, a study involving 2232 participants (Ruusunen et al, 2010). The three studies undertaken individually identified an inverse association between coffee consumption and the risk of depression. It is important to note that the present study differs from previous prospective studies. Firstly, the mean age of the participants in our cohort was 37 years, in contrast to 53 years in the Ruusunen et al. study (Ruusunen et al, 2010). 62 years in the NIH-AARP study (Guo et al, 2014) and 63 years in the Nurses' Health Study (Lucas et al, 2011) In the Finnish study, the outcome was assessed by discharge diagnosis for depressive disorder (Ruusunen et al, 2010), whereas the outcome in our study was based on participants' self-reports, consistent with the other two studies (Lucas et al, 2011).In this prospective study conducted in Spain as the SUN cohort (Seguimiento Universidad de Navarra), it was reported that among 14,413 participants, those who consumed ≥4 cups of coffee per day had a lower risk of depression compared to those who consumed <1 cup of coffee per day. On initial consideration, this finding appears to be at odds with the finding that participants who

consumed more than 4 cups of coffee per day had significantly higher depression scores in the present study (Navarro et al, 2018).However, it should be noted that the two studies have significant differences in terms of design, population and variable control. Whilst the SUN study incorporated university graduates, it utilised a prospective design involving a long-term follow-up period (average 10 years), our cross-sectional study was conducted in a population exhibiting distinct sociodemographic characteristics and working conditions, such as hospital staff. Furthermore, in the SUN study, participants' dietary and lifestyle factors were updated at regular intervals, and cases of depression were defined according to the coexistence of a new physician diagnosis and antidepressant use. Consequently, the direction and strength of the relationship between coffee consumption and depression may be influenced by factors such as age, education, general health, physical activity and working conditions of the population. A more detailed and systematic control of these factors in prospective follow-up may lead to differentiated results. As demonstrated in our study, depression scores increased with the consumption of coffee types with higher caffeine content, such as espresso. This suggests that multifaceted factors, including caffeine intensity, duration of use and living conditions, may shape the risk of depression rather than the amount of coffee consumption alone.

Conclusion

Healthcare workers who consumed coffee for more than three years had a 73.6% increased risk of developing depression. In conclusion, the findings suggest that there may be a significant relationship between coffee types with high caffeine content and long/intensive coffee consumption habits and depression levels. Furthermore, individual characteristics such as socioeconomic status, gender and body mass index may play a significant role in this relationship. It is hypothesised that future prospective multicentre studies with larger participant groups may provide a more comprehensive understanding of the interaction between coffee consumption and depression in terms of causality. Consequently, the development of preventative health strategies and awareness studies, particularly for individuals with high coffee consumption or caffeine sensitivity, becomes a viable prospect. Prospective randomized studies with larger patient numbers are needed to support our findings. Furthermore, instead of reporting coffee consumption in terms of "cups," calculating caffeine content based on objective measurements will increase the accuracy of the results. Since caffeine concentration can vary due to different types of coffee (Turkish coffee, espresso, filter coffee, etc.) or brewing methods, an approach that takes these differences into account can more reliably reveal caffeine exposure levels.

Ethical Consideration: The study was approved by Karabük University Non-Interventional Clinical Research Ethics Committee (date: 17.09.2024, number: 2024/1874). The study was also approved by the Ministry of Health, Karabük Training and Research Hospital Chief Medical Directorate (date: 05.11.2024, number: 258624207).

Conflict of Interest: The authors declared no conflict of interest.

Funding: The study has received no financial support.

Author Contributions: İdea: UK, Hİ, MMŞ.; Design: UK.; Check: Hİ, MMŞ; Data collection and/or processing: UK, Hİ, MMŞ.; Analysis: UK, Hİ, MMŞ.; Literatüre Review: UK, Hİ, MMŞ; Written By: UK, Hİ, MMŞ.; Critical Review: UK, Hİ, MMŞ.

Peer Review: Internal/External independent

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